

Important Information:

- This is not really a proper homework assignment. It is more of a review of material that you should already be familiar with from Calculus 16A, or elsewhere.
 - You do **not** need to hand this in in discussion section on week one, although you are **strongly** advised to complete all the exercises over the first week. You'll be rusty after the break and doing these will get your brain back in gear.
 - Many of the exercises below are fairly straightforward. A few though, will test you. You'll need to review the appropriate concepts to do them. I've included them to make sure you understand straightway that this course won't necessarily all be clear sailing. You're going to have to work hard to do well.
 - In general, homework assignments for this class can be lengthy, but a lot of practice solving problems is essential for learning the material. Be organised, and don't leave things for a marathon session the night before discussion section. Instead, get a good start on the homework over the weekend (or even earlier!) . As a rough guideline expect to spend anywhere between 3 and 8 hours a week on a problem set.
 - Discussing problems with your classmates is permitted and is a good way to make it more fun and gain a deeper understanding. However you should **always** begin each problem alone. I can't emphasise this point enough. If you've attacked a question from multiple directions over at least an hour and are completely stuck, that's the time to discuss it with your peers, not before. If solving a problem is like building a house, the initial time working alone is like laying the foundations. If you don't do it, then even if you end up with a solution after talking to other people, everything is at risk of collapse because it doesn't have a solid base. I've seen students work in big groups the moment they start a homework assignment and it tends to dramatically dilute individual understanding. Remember, you don't sit exams as a group, you sit them on your own. That said by all means talk to each other, just do it after you've spent some serious time on your own. And remember when you hand in proper homework, you must **write all the solutions yourself**. Copying of solutions is cheating and will be dealt with severely.
 - Good Luck!
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Functions

1. Let $f(x) = x^3 + \frac{1}{x^2}$. Evaluate $f(1)$, $f(4)$, $f(-2)$ and $f(-\frac{1}{3})$. Does $f(0)$ make sense? If not, why not?
2. Determine which points are in the graph of the function $f(x) = x^2 + 6$: $(1, 8)$, $(2, 10)$, $(-\frac{1}{2}, -1)$.
3. Find the points of intersection of the curves $y = -x^2 + x + 1$ and $y = x - 5$.
4. Let $f(x) = x^2 + x - 3$, $g(x) = \frac{1}{x}$ and $h(x) = \frac{1}{\sqrt{x-1}}$. Determine the following functions: $f(g(x))$, $g(f(x))$, $h(g(x))$.

The Derivative

1. Find the equation of the line through $(1, 1)$ with slope 2. Draw its graph.
2. Differentiate $f(x) = x^8 + x^2 + 1$.
3. Differentiate $f(x) = \frac{1}{x^2+4}$.
4. Differentiate $f(x) = \sqrt{x + \sqrt{x}}$.
5. Find the equation of the tangent line to the curve $y = x^2$ at the point $(-2, 4)$.
6. Find the second derivative of the function $f(x) = e^{x^2}$. (Hint: You'll need to use both the product rule and the chain rule.)
7. Let x and y be related by the equation $x^2y^3 - xy = 6$. Using implicit differentiation Determine the value of $\frac{dy}{dx}$ at $(1, 2)$.

The Integral

1. Calculate the following indefinite integral $\int 4dx$
2. Calculate the following indefinite integral $\int x^4 + xdx$
3. Calculate the following indefinite integral $\int e^{x/2}dx$
4. Calculate the following indefinite integral $\int (\frac{4}{2x+3} - \frac{x}{3})dx$
5. Calculate the following definite integral $\int_{-1}^2 \sqrt{2x+4}dx$.
6. Calculate the following definite integral $\int_0^1 \frac{3+e^{2x}}{e^x}dx$.
7. Find the area under the curve $y = 1 + \sqrt{x}$ from $x = 1$ to $x = 9$.
8. A rock thrown straight up in the air has a velocity of $v(t) = -9.8t + 50$ at time t . Determine the distance the rock travels in the first 4 seconds.